

# California Education and the Environment Initiative

Increasing Environmental Literacy for K–12 Students...

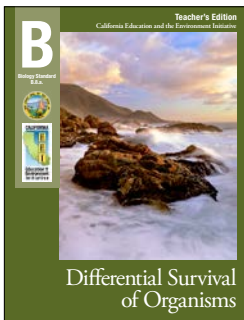
Because the Future is in Their Hands



## TEACH COMMON CORE STANDARDS WITH THE EEI CURRICULUM

Created with your needs in mind, this document shows the correlation between the EEI Curriculum and the California Common Core State Standards. By teaching the EEI unit lessons in your classroom, you will be simultaneously addressing the Common Core standards depicted in this guide.

### B.8.a.—Differential Survival of Organisms



In this unit, students explore how natural selection determines the differential survival of groups of organisms. Both abiotic and biotic natural factors and human activities that affect these factors influence the differential survival of organisms within a population of a given species. Factors that can influence the survival of groups of organisms include local changes in average temperature (abiotic factor); increased numbers of predators (biotic factor); and the introduction of nonnative species (biotic factor that results from human activity). After examining the changes to the environment that can result from natural abiotic and biotic factors, as well as human activities and practices, students study how each of these factors influences the differential survival of groups of organisms. Students then learn how the differential survival of groups of organisms forms the basis of natural selection and evolution. Students use the knowledge they gain to further explore through case studies how human activities affect both the rates of change in an environment and the differential survival of groups of organisms in that environment. The final lesson provides students with the opportunity to predict the factors that can cause significant changes to the distribution of organisms.

|                        |                        | COMMON CORE STANDARDS |            |            |            |            |            |            |            |             |             |             |             |             |             |             |             |           |           |           |          |           |
|------------------------|------------------------|-----------------------|------------|------------|------------|------------|------------|------------|------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------|-----------|-----------|----------|-----------|
|                        |                        | RST.9–10.1            | RST.9–10.2 | RST.9–10.4 | RST.9–10.5 | RST.9–10.6 | RST.9–10.7 | RST.9–10.8 | RST.9–10.9 | RST.9–10.10 | RST.11–12.2 | RST.11–12.9 | WHST.9–10.1 | WHST.9–10.2 | WHST.9–10.4 | WHST.9–10.7 | WHST.9–10.9 | SL.9–10.1 | SL.9–10.2 | SL.9–10.4 | L.9–10.6 | L.11–12.5 |
| LESSONS                | California Connections |                       | ✓          | ✓          |            | ✓          |            | ✓          | ✓          | ✓           |             | ✓           | ✓           |             |             |             |             |           |           |           |          | ✓         |
|                        | 1                      | ✓                     | ✓          | ✓          |            |            | ✓          | ✓          |            | ✓           | ✓           |             |             |             |             |             | ✓           | ✓         |           | ✓         | ✓        |           |
|                        | 2                      | ✓                     | ✓          | ✓          | ✓          |            | ✓          |            |            | ✓           | ✓           |             | ✓           | ✓           |             | ✓           | ✓           | ✓         |           |           | ✓        |           |
|                        | 3                      |                       | ✓          | ✓          | ✓          |            |            |            |            |             |             |             |             | ✓           | ✓           | ✓           | ✓           | ✓         | ✓         |           | ✓        |           |
|                        | 4                      | ✓                     | ✓          | ✓          | ✓          |            | ✓          | ✓          |            |             |             |             |             | ✓           |             |             | ✓           | ✓         |           |           | ✓        |           |
|                        | 5                      | ✓                     | ✓          | ✓          |            |            | ✓          | ✓          |            |             |             |             |             |             |             |             | ✓           | ✓         |           |           | ✓        |           |
| Traditional Assessment |                        |                       |            |            |            |            |            |            | ✓          | ✓           |             |             | ✓           |             |             |             |             |           |           |           |          |           |
| Alternative Assessment |                        | ✓                     |            |            |            |            | ✓          | ✓          |            |             | ✓           | ✓           | ✓           |             |             |             |             |           |           |           |          |           |

**Note:** For your reference, the list of California Common Core State Standards abbreviations is on the following page.

## Using the EEI-Common Core Correlation Matrix

The matrix on the front page identifies a number of Common Core standards that are supported by this EEI unit. However, the check marks in the matrix do not necessarily signify that the Common Core standards checked will be taught to mastery by using this EEI unit alone. Teachers are encouraged to select which Common Core standards they wish to emphasize, rather than teaching to every indicated standard. By spending more time on selected standards, students will move toward greater Common Core proficiency in comprehension, critical thinking and making reasoned arguments from evidence. Teaching this EEI unit will provide opportunities for teachers to implement the shift in instructional practice necessary for full Common Core implementation.

## California Common Core State Standards Abbreviations

- **CCCSS:** California Common Core State Standards
- **L:** Language Standards
- **RST:** Reading Standards for Literacy in Science and Technical Subjects
- **SL:** Speaking and Listening Standards
- **WHST:** Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

**Note:** Since each Common Core standard includes a breadth of skills, in this correlation, the portion of the standard description that is featured in the Common Core standards applications is cited, using “...” to indicate omitted phrases. For a list of the complete standard descriptions, please see the Common Core Reference Pages located on pages 21–22 of this document.

## A Note about Common Core Speaking and Listening Standards

Throughout this unit, students participate in various learning structures and groups to analyze, discuss, and synthesize data, which supports the skill in Speaking and Listening Standard 1 “Participate effectively in a range of collaborative discussions (one-on-one, groups...) with diverse partners.” With prior instruction on collaborative discussions, these various groupings and the materials students examine lend themselves to prime discussion material for collaborative discussions. Learning structures with tasks for pairs and groups are in the following lessons:

- **Lesson 1:** Individual, whole class
- **Lesson 2:** Individual, pairs, whole class
- **Lesson 3:** Individual, small groups, whole class
- **Lesson 4:** Individual, small groups, whole class
- **Lesson 5:** Individual, groups of 4, whole class

## National Geographic Resources

No maps or posters are used with this unit.

## Unit Assessment Options

| Assessments   | Common Core Standards Applications   |
|---|--|
| <b>Traditional Assessment</b>   |  |
| Students complete multiple-choice and short answer questions per the unit topic.  | <p><b>RST.9–10.10:</b> By the end of grade 10, read and comprehend science/technical texts...independently and proficiently.</p> <p><b>RST.11–12.2:</b> Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p> <p>d) Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.</p>   |
| <b>Alternative Assessment</b>   |  |
| <p>Students read and evaluate information in order to complete a detailed case study, and then write two well-developed paragraphs synthesizing their learning.</p> <p><b>Suggestion:</b> Provide students the option to develop a multi-media presentation to evaluate the case study.</p> | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p><b>RST.9–10.7:</b> Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p><b>RST.9–10.8:</b> Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.</p> <p><b>RST.11–12.9:</b> Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p><b>WHST.9–10.1:</b> Write arguments focused on <i>discipline-specific content</i>.</p> <p>a) Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including... scientific procedures/experiments, or technical processes.</p> |

## Lesson 1: Where and Why of Species Distribution

Students read about the “rediscovery” of sea otters off the California coast. They compare physical parameters of oceans along the east and west coasts of North America. They relate these parameters to the distribution of kelp and explore how this directly affects the distribution and differential survival of sea otters.



Use this correlation in conjunction with the **Procedures** located on pages 40–42 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

| Student Tasks   | Common Core Standards Applications  |
|---|---|
| <p><b>Vocabulary Development:</b> For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>   | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p>                  |
| <p><b>Step 1:</b> Students read <b>California Connections: A Second Chance for Sea Otters</b> (Student Edition, pages 2–5) and discuss ecosystem components and environmental factors related to sea otters and kelp.</p> <p><b>Suggestion:</b> Conduct a ‘close reading’ with this selection. On the first reading, have students read the selection independently. On the second reading, have students independently identify academic and domain-specific vocabulary. On the final reading, have students independently locate text that supports their answers to the following questions. Then have students discuss their answers with the class:</p> <ul style="list-style-type: none"> <li>■ Why is kelp an important ecosystem component for sea otters? (<i>It is the food source for sea urchins, the preferred prey of the otters.</i>)</li> <li>■ Which environmental factors discussed earlier affect the distribution and survival of kelp? (<i>Sunlight, ocean temperature, nutrient availability, rocky substrate of the ocean floor</i>)</li> <li>■ Which environmental factors discussed affect the distribution of sea otters? (<i>Temperature, food resources [quantity of sea urchins], distribution of kelp</i>)</li> </ul> <p><b>Suggestion:</b> Refer to the Reading California Connections Using a Common Core Reading and Writing Focus on pages 16–20 to view specific suggestions for integrating Common Core standards while reading the selection not only for content, but for text structure as well.</p> | <p><b>RST.9–10.2:</b> Determine the central ideas or conclusions of a text...</p> <p><b>RST.11–12.2:</b> Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> |

| Student Tasks   | Common Core Standards Applications   |
|---|--|
| <p><b>Step 2:</b> Complete <b>Physical Parameters Data Chart</b> with the students by projecting <b>Sea Surface Temperatures—North America</b> (Visual Aid #1), <b>Ocean Nitrates—North America</b> (Visual Aid #2), and <b>Ocean Phosphates—North America</b> (Visual Aid #3).</p> <p><b>Suggestion:</b> Ask students to predict where they may find kelp forests based upon the data they recorded.</p>   | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts...</p> <p><b>RST.9–10.7:</b> Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p><b>RST.9–10.10:</b> By the end of grade 10, read and comprehend science/technical texts...independently and proficiently.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>  |
| <p><b>Steps 3 and 4:</b> Define and discuss “upwelling”, “distribution”, and “differential survival”. Project <b>Pacific Ocean Upwellings</b> (Visual Aid #4) and compare it against <b>Sea Surface Temperatures</b> (Visual Aid #1).</p>   | <p><b>RST.9–10.7:</b> Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners...</p> <p><b>SL.9–10.4:</b> Present information, findings, and supporting evidence clearly, concisely, and logically...</p>  |
| <p><b>Steps 5 and 6:</b> Discuss the habitat of the sea otter while viewing <b>Kelp Forests</b> (Visual Aid #5) and <b>Historical Distribution of Sea Otters</b> (Visual Aid # 6). Relate the stability of kelp forests to otter populations and discuss what might happen if otter populations become threatened again. Assign <b>Effects of Natural Factors on Differential Selection</b> (Student Workbook, pages 3–4) for homework.</p> <p><b>Tip:</b> If <b>Student Workbooks</b> need to be reused from year to year, students should not write in them. Some strategies teachers use to preserve the workbooks are:</p> <ul style="list-style-type: none"> <li>■ Have students use binder paper or other lined or unlined paper.</li> <li>■ Have students use a sheet protector over the page and write with a whiteboard marker.</li> <li>■ Do together as a class on a projector or chart paper.</li> <li>■ Project the digital fill-in version and do together as a class.</li> <li>■ Students use digital devices to fill in the digital version found on the website.</li> <li>■ Make student copies when necessary.</li> </ul> | <p><b>RST.9–10.7:</b> Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p><b>RST.9–10.8:</b> Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners...</p> <p>c) Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p> |

## Lesson 2: Patterns of Change over Time

Students study examples of how the average phenotypes of a variety of populations change as a result of shifting environmental conditions. They predict which phenotypes will be favored under certain conditions and look at examples of shifts in species dominance that result from natural disturbances.



Use this correlation in conjunction with the **Procedures** located on pages 58–60 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

| Student Tasks  | Common Core Standards Applications  |
|--|---|
| <p><b>Vocabulary Development:</b> For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>  | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p>  |
| <p><b>Step 1:</b> Review <b>Physical Parameters Chart</b> from the prior lesson. Have students create an <b>Environmental Factors Chart</b> from a teacher-produced model. Pair students and have them complete their charts together and then discuss with the whole class.</p> | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts...</p> <p><b>RST.9–10.7:</b> Translate quantitative or technical information expressed in words in a text into visual form...</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p> |

| Student Tasks   | Common Core Standards Applications  |
|---|---|
| <p><b>Step 2:</b> Define and discuss the word “phenotype.” Review <b>Environment and Phenotype Shifts individually</b> (Student Workbook, pages 5–9). Review <b>Phenotype Variation in Rock Pocket Mice</b> (Visual Aid #7) and make predictions related to phenotype. Complete Question #1 by comparing the phenotype and substrate.</p> <p><b>Suggestion:</b> Place different phenotype and substrate characteristics on cards and have different students choose the cards and define, explain, and rationalize their answers in a class discussion.</p> | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including...scientific procedures/experiments, or technical processes.</p> <p>d) Use precise language and domain-specific vocabulary to manage the complexity of the topic...</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p> |
| <p><b>Steps 3 and 4:</b> Students read individually about guppies and house sparrows pages 6 &amp; 7 in <b>Environment and Phenotype Shifts</b> (Student Workbook, pages 6–7). View and discuss <b>Predation and Guppy Body Size</b> (Visual Aid #8) and <b>Map of Sparrow Body Size Variation</b> (Visual Aid #9) as a class.</p> <p><b>Suggestion:</b> Correct any student misconceptions while discussing and reviewing new knowledge regarding phenotypes and environmental changes as related to guppies and house sparrows.</p>                       | <p><b>RST.9–10.5:</b> Analyze the structure of the relationships among concepts in a text...</p> <p><b>RST.9–10.10:</b> By the end of grade 10, read and comprehend science/technical texts...independently and proficiently.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners...</p> <p>d) Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.</p> <p><b>WHST.9–10.1:</b> Write arguments focused on <i>discipline-specific content</i>.</p>  |

| Student Tasks  | Common Core Standards Applications   |
|--|--|
| <p><b>Steps 5 and 6:</b> Conduct a general class discussion regarding phenotypes and species adaptations for survival. Discuss environmental shifts and consequences for a species. Have students read and complete Part 2 of <b>Environment and Phenotype Shifts</b> (Student Workbook, pages 8–9).</p> | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts...</p> <p><b>RST.9–10.2:</b> Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p><b>RST.11–12.2:</b> Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <p>c) Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.</p> <p><b>WHST.9–10.1:</b> Write arguments focused on <i>discipline-specific content</i>.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including...scientific procedures/ experiments...</p> |
| <p><b>Step 7:</b> Have students complete Part 3 of <b>Environment and Phenotype Shifts</b> for homework using the <b>Environmental Factors Chart</b> as a reference guide.</p>   | <p><b>WHST.9–10.1:</b> Write arguments focused on <i>discipline-specific content</i>.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including...scientific procedures/experiments...</p> <p><b>WHST.9–10.7:</b> Conduct short...research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject...</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>  |

## Lesson 3: Selection Pressures Drive Evolution

Students read about and study photographs of marine organisms, focusing on adaptations essential to their survival. They categorize the adaptations on a chart according to the selection pressures that likely resulted in the adaptations and describe how natural factors can influence the differential survival of organisms.



Use this correlation in conjunction with the **Procedures** located on pages 74–75 of the Teacher’s Edition. Only procedure steps with a Common Core correlation are included in the table below.

| Student Tasks   | Common Core Standards Applications  |
|---|---|
| <p><b>Vocabulary Development:</b> For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>   | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p>  |
| <p><b>Steps 1 and 2:</b> Explain to students that adaptations are specific characteristics, such as a change in the body or behavior of a species that occurs in response to a new condition or environment.</p> <p>Discuss ‘natural selection,’ ‘evolution,’ ‘biotic,’ and ‘abiotic’ environmental factors. Divide students into groups of four and distribute one set of <b>Selection Pressures Cards</b> (Teacher’s Masters, page 2) to each group for use in Step 3. Project <b>Selection Pressures Chart</b> and complete as a whole class after groups have discussed answers separately.</p> | <p><b>RST.9–10.5:</b> Analyze the structure of the relationships among concepts in a text, including relationships among key terms...</p> <p><b>SL.9–10.2:</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally), evaluating the credibility and accuracy of each source.</p> <p><b>WHST.9–10.7:</b> Conduct short...research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p> |

| Student Tasks   | Common Core Standards Applications   |
|---|--|
| <p><b>Step 3:</b> Distribute one set of <b>Adaptations to Selection Pressures</b> (Information Cards #1–4) to each small group. Prompt groups to read and discuss the cards.</p> <p>Allow students 10 minutes to work independently to complete Part 1 of <b>Selection Pressures and Adaptations Chart</b>.</p> | <p><b>RST.9–10.2:</b> Determine the central ideas or conclusions of a text;...provide an accurate summary of the text.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <ul style="list-style-type: none"> <li>a) Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</li> <li>b) Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.</li> <li>d) Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.</li> </ul> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts...</p> |
| <p><b>Steps 4 and 5:</b> Review the definition of ‘selection pressures’ and review each column of the <b>Selection Pressures Chart</b>, adding adaptations as discussed. Have students complete Part 2 of <b>Selection Pressures and Adaptations Chart</b>.</p>   | <p><b>RST.9–10.5:</b> Analyze the structure of the relationships among concepts in a text, including relationships among key terms...</p> <p><b>WHST.9–10.4:</b> Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p>  |

## Lesson 4: Natural Factors and Human Activities Change Environments

Students examine and discuss relationships among various components of an ocean ecosystem. They read information about a coastal wetland ecosystem and use this information to create an ecosystem map including both natural and human-related factors. They discuss how these factors can change the coastal wetland ecosystem.



Use this correlation in conjunction with the **Procedures** located on pages 90–91 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

| Student Tasks  | Common Core Standards Applications   |
|--|--|
| <p><b>Vocabulary Development:</b> For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>  | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p>                                   |
| <p><b>Steps 1 and 2:</b> Project <b>Ocean Systems Diagram</b> (Visual Aid #10). Discuss what the diagram represents, the connections and relationships between species composition, and ecosystem components.</p> <p>Identify abiotic and biotic components on the <b>Ocean Systems Diagram</b>.</p>   | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.5:</b> Analyze the structure of the relationships among concepts in a text, including relationships among key terms...</p> <p><b>RST.9–10.7:</b> ...translate information expressed visually or mathematically (e.g., in an equation) into words.</p> |
| <p><b>Step 3:</b> Have students read <b>Coastal Wetland Background Information</b> (Student Edition, pages 6–7) and record their answers on <b>Coastal Wetland Changes</b> (Student Workbook, pages 13–14). Separate students into groups of four and have each group discuss their reading regarding natural factors and environmental changes.</p> | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p>   |

| Student Tasks   | Common Core Standards Applications  |
|---|---|
| <p><b>Step 3 (Continued):</b></p>   | <p><b>RST.9–10.2:</b> Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions...</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>  |
| <p><b>Steps 4 and 5:</b> Have groups make and create a “coastal wetland system diagram” and list biotic and abiotic natural factors identified in the previous steps. Have students copy the diagram on Question 2 in <b>Coastal Wetland Changes</b>. Have groups discuss four natural factors (biotic and abiotic) that can change coastal wetland systems. Have all students complete Question 3 on <b>Coastal Wetland Changes</b>.</p> <p><b>Suggestion:</b> Have students discuss the strengths of each of the diagrams and ways in which peers interpreted and depicted the information.</p> | <p><b>RST.9–10.7:</b> Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>  |
| <p><b>Steps 6 and 7:</b> Provide groups four minutes to discuss and consider how natural factors can change and influence the coastal wetland environment. Provide an additional four minutes for a discussion about human influences that are beneficial and detrimental. Have students summarize the discussion of “connections,” and discuss cycles related to dependence, benefits, and alterations. Have all students complete Question 4 of <b>Coastal Wetland Changes</b>.</p>   | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p><b>RST.9–10.2:</b> Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.</p> <p><b>RST.9–10.8:</b> Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>WHST.9–10.2:</b> Write informative/explanatory texts, including...scientific procedures/experiments, or technical processes.</p> |

## Lesson 5: Human Activities, Natural Factors, and Differential Survival

Students view maps of the historical and current distribution of sea otters, in order to examine the distribution and differential survival of this species throughout its range. They explore how human activities affect sea otter survival, and participate in class discussions and analyze effects through written responses.



Use this correlation in conjunction with the **Procedures** located on pages 102–103 of the Teacher's Edition. Only procedure steps with a Common Core correlation are included in the table below.

| Student Tasks   | Common Core Standards Applications  |
|---|---|
| <p><b>Vocabulary Development:</b> For depth of understanding, vocabulary may be featured within the context of the unit instead of or in addition to the beginning of the lesson.</p>   | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p>  |
| <p><b>Steps 1 and 2:</b> Project and review <b>Kelp Forests</b> (Visual Aid #5) and discuss where kelp forests grow. Divide the class into groups of 4 students and project <b>Historical Distribution of Sea Otters</b> (Visual Aid #6) and <b>Current Sea Otter Distribution</b> (Visual Aid #11). Discuss past and current sea otter geographical distribution areas and changes. Have students turn to <b>Sea Otters and Human Activities</b> (Student Workbook, pages 15–21) and complete Question #1.</p> | <p><b>RST.9–10.2:</b> Determine the central ideas or conclusions of a text...</p> <p><b>RST.9–10.7:</b> ...translate information expressed visually or mathematically (e.g., in an equation) into words.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions..., building on others' ideas and expressing their own clearly and persuasively.</p> <p>a) Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.</p> <p>b) Work with peers to set rules for collegial discussions and decision-making...</p> |

| Student Tasks  | Common Core Standards Applications   |
|--|--|
| <p><b>Steps 1 and 2 (Continued):</b></p>   | <p>c) Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p>  |
| <p><b>Step 3:</b> In the same groups, have students read and discuss Part 1 and answer questions 2 through 7 of <b>Sea Otters and Human Activities</b> (Student Workbook, pages 15–21).</p>  | <p><b>L.9–10.6:</b> Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p> <p><b>RST.9–10.4:</b> Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to <i>grades 9–10 texts and topics</i>.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p> |
| <p><b>Step 4:</b> Have students read and discuss Part 2 of <b>Sea Otters and Human Activities</b> in their groups. Ask students to discuss what activities have influenced sea otter survival. Review with students the concept of “differential survival.” Have students use the discussion information to answer Questions 8–12 in <b>Sea Otters and Human Activities</b>.</p> | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p><b>RST.9–10.8:</b> Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p>  |

| Student Tasks  | Common Core Standards Applications   |
|--|--|
| <b>Step 4 (Continued):</b>   | <b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.  |
| <b>Steps 5 and 6:</b> Project <b>Effects of Human Activities on Sea Otters</b> (Visual Aid #12) and have students identify four examples of human activities that could have an effect on sea otters. Have students complete <b>Sea Otters and Human Activities</b> , Questions 13–15. | <p><b>RST.9–10.1:</b> Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.</p> <p><b>SL.9–10.1:</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on <i>grades 9–10 topics, texts, and issues</i>, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>WHST.9–10.9:</b> Draw evidence from informational texts to support analysis, reflection, and research.</p> |

## Unit Assessment

Refer to the introduction pages at the front of this document for information regarding the Traditional and Alternative Assessments for this unit and their Common Core correlations.

### Reading *California Connections* using a Common Core Reading and Writing Focus

#### Reading

Science teachers can further enhance the teaching of Common Core Reading Literacy Standards by noting the suggestions below and in the following pages while reading the ***California Connections*** selection for content. Explicitly teach students to pay attention to the structure of the text by noting the following:

- Note how the author cites evidence to support main points; note any gaps or inconsistencies. **(RST.9–10.1 and RST.11–12.1)**
- Note how the author sets up the central ideas or conclusions; trace the text’s explanation or depiction of a process or concept; summarize concepts, processes, and information by paraphrasing the text. **(RST.9–10.2 and RST.11–12.2)**
- Note how the author explains multi-step procedures. **(RST.9–10.3 and RST.11–12.3)**
- Note how the author explains the meaning of key terms, symbols, domain-specific words, and phrases. **(RST.9–10.4 and RST.11–12.4)**
- Analyze the structure of the relationships among concepts in a text, and the relationships among key terms, including categories or hierarchies. **(RST.9–10.5 and RST.11–12.5)**
- Analyze the author’s purpose in providing an explanation, or describing a procedure, and how this defines the question the author seeks to address; identify important unresolved issues. **(RST.9–10.6 and RST.11–12.6)**
- Note how the information in the ***California Connections*** text integrates with information provided throughout the unit in diverse formats, including tables, charts, maps, and quantitative data. **(RST.9–10.7 and RST.11–12.7)**
- Assess the extent to which the reasoning and evidence in a text support the author’s claim; evaluate the analysis and conclusions in the text. **(RST.9–10.8 and RST.11–12.8)**
- When other documents are included, compare and contrast findings presented in this text to those in other sources, noting when the findings support or contradict previous explanations. **(RST.9–10.9 and RST.11–12.9)**
- Note comprehension strategies for understanding science text. **(RST.9–10.10 and RST.11–12.10)**

**Note:** Standard descriptions are paraphrased, using terminology that applies to reading a ***California Connections*** selection.

#### Writing

Many ***California Connections*** selections can be used as a model for future student writing tasks applying the Writing Literacy Standards by noting how the author structures the text, organizes the ideas, and provides well-chosen relevant and sufficient facts, extended definitions, concrete details, quotations, or other information and examples.

#### Using the *California Connections* Selection


The following pages note specific places where the ***California Connections*** selection provides examples for specific Writing Literacy Standards for Science and Technical Subjects, using this selection as a writing model. They also provide suggestions for teaching students to analyze text structure using the Reading Literacy Standards for Science and Technical Subjects. Teachers can incorporate more suggestions from the list above.

**RST.9–10.10:** By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

**Suggestion:** Prior to reading, have students discuss the strategies they may use to read a science or technical text. Point out that the strategies may differ from the strategies they use to read fiction or narrative text.

California Connections: A Second Chance for Sea Otters  
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## A Second Chance for Sea Otters




One spring morning in 1938, Howard Granville Sharpe gazed at the ocean through his telescope. Sharpe lived 13 miles south of Carmel, California, at the edge of a rocky cliff overlooking the sea. On this particular morning he glanced over the plentiful kelp beds close to shore. Something caught Sharpe's eye: It floated lazily on its back, covered with long strands of kelp. Was it a small seal or sea lion?

Sharpe did not think it was either.

Sharpe called the California Department of Fish and Game. Commissioners there insisted the animal he saw was a seal or sea lion, but Sharpe protested: he knew what a sea lion looked like, and this creature did not match up with the animals in his pictures. For one thing, the animal was smaller and had beautiful, thick fur. Soon Sharpe located more of these creatures with his telescope; when he looked closer, he saw that they had white furry faces. They look "like muskrats," Sharpe said. As it turned out, Sharpe had "rediscovered" the lost member of the Mustelidae family, the southern sea otter (*Enhydra lutris nereis*), that until that point was thought to be extinct.

**Range of the Otter**  
There are 13 species of otters in the world; only one of



Sea otter with urchin

these species lives in a marine environment. *Enhydra lutris* consists of three subspecies. Sea otters only live in regions of the Pacific Ocean along North America and north

Asia. The playful *E. l. lutris* lives near the Kuril Islands stretching from Japan to Russia; *E. l. kenyoni* lives throughout the Aleutian chain, the Alaska Peninsula, British Columbia, and

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**RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...

- Kelp
- Sea lion
- Mustelidae family
- Subspecies

**Suggestion:** There are many references in the first section of this text that identify the scientific names of the species of otters. Provide students the opportunity to identify the location of the species mentioned and discuss scientific naming conventions.

California Connections: A Second Chance for Sea Otters  
Lesson 1 | page 2 of 4



Sea otters

Washington; and *E. l. nereis* lives along the western coast of North America, from Monterey Bay National Marine Sanctuary to a point just below Point Conception near Santa Barbara. One population persists on San Nicolas Island off the coast of Los Angeles, and is currently the southern-most geographic extent. At times, a few southern sea otters have been spotted as far south as Baja California.

#### Changing Population

Historians estimate that 150,000 to 300,000 sea otters occupied the world's oceans before hunters started killing these animals for their beautiful pelts

in 1741. By the early 1900s, 1,000 to 2,000 otters remained, only 50 of which lived off the coast of Central California. Land managers passed the International Fur Seal Treaty of 1911 to protect fur seals, but it ended up protecting several other fur-bearing species, including sea otters. The treaty was the first international law enacted for wildlife conservation, and it effectively stopped the slaughter of certain marine mammals for their valuable fur.

Since 1911, otter populations have increased, though not without setbacks. When disease and environmental factors affected otters and other marine

mammals in the early 1970s, lawmakers passed the Marine Mammal Protection Act to protect and replenish otter, seal, and sea lion populations. Today more than 100,000 sea otters occupy 75% of their original habitat. In the northern Pacific Ocean, sea ice limits the otters' distribution. In California, where winters are warm, the location and condition of the kelp beds where otters forage for food determine the otter's distribution and rates of survival.

#### Adaptations for a Cold Ocean

Sea otters can grow up to five feet long, and weigh up to 100 pounds. They have wide,

**RST.9–10.9:** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.

**RST.11–12.9:** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

**Suggestion:** Assign each of the laws to groups to research the following questions:

- Who passed the law and which countries supported the law?
- Who were affected by the laws?
- Who is responsible for enforcing the laws?

**RST.9–10.8:** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

**Suggestion:** Ask students how the passage of the International Fur Seal Treaty may have protected fur seals and why there was a need for the further protections afforded in the Marine Mammal Protection Act.

**RST.9–10.6:** Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.

**Suggestion:** Have students discuss why the author is describing the sea otters’ physical attributes, behavior, and habitat in such detail. How does adding such details in this selection enhance the reader’s understanding of the situation and/or conflict?

California Connections: A Second Chance for Sea Otters  
Lesson 1 | page 3 of 4

cream-colored heads with small eyes and thick, glossy coats that range in color from dark brown to black. Otters use their webbed hind feet to propel themselves through water at a slow pace on their backs. When threatened, otters flip onto their stomachs and swim away.

Otters dive for food, foraging for sea urchins, sea stars, crabs, abalone, and mussels. They roll on their backs, place a small rock on their stomachs, and use their five-fingered paws to smash sea urchins against the rock. Otters are the only marine mammals to use such tools. If you concentrate while walking along the shore or sitting quietly in a boat, you can

sometimes hear the clicking of shells on rock above the sound of the waves.

In addition to eating and sleeping, sea otters spend large amounts of time grooming their luxurious fur. The pelts, valued by hunters since the 1700s, allow the otters to survive in cold water. One square inch of an otter’s coat contains approximately 1 million hairs. That is 10 times the number of hairs on a human head! Because otters have no extra fat on their bodies, they rely heavily on having healthy coats to keep them warm.

**The Kelp Forest**

When resting, otters often wrap themselves in long strands



of kelp, which keep them from drifting away. Scientists identify sea otters as a “keystone” species, because the presence or absence of these animals affects the size and health of rich kelp forest ecosystems. Without otters to feed on sea urchins, the hungry urchins can devour entire kelp forests and create an urchin-dominated community.

Ocean temperature, light, nutrient availability, competition, and the condition of the rocky substrate (ocean bottom) all affect the abundance of kelp, the home of sea urchins, the otter’s preferred food supply. The health of the kelp forest also depends on a process called upwelling, in which winds create currents that bring up nutrient-rich water from the bottom of the ocean. When certain naturally derived nutrients, such as nitrates and phosphates, are plentiful, the abundance of kelp increases, providing food for the sea urchins to thrive. Weather patterns, such as El Niño, warm the water and disrupt the process of upwelling, which in turn affects marine organisms that depend on coastal productivity. An invasive species of kelp called *Undaria* spp., which is growing along the California coast and is sold as wakame seaweed, competes with the kelp, reducing its abundance.

Sea otter

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**WHST.9–10.1:** Write arguments focused on discipline-specific content.

- a) Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

**Suggestion:** Help students identify the interdependent relationship sea otters have with the kelp forest. Ask students to identify the development of the topic through the selection and identify how the information presented helped create a better understanding of the relationship.

**RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context...

- Abalone
- Keystone
- Substrate
- Upwelling

**L.11–12.5:** Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

**WHST.9–10.1:** Write arguments focused on discipline-specific content.

- Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.

**Suggestion:** After students read this selection, have them identify the claims made by the author and the evidence the author uses to support the claim. Ask students to identify areas of bias (if any) and the techniques the author uses to sway the reader.


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These changes to kelp forests affect the populations of the marine organisms that live there, including organisms that the sea otter depends upon for its diet.

**Threats to the Otter**  
Today, oil presents one of the greatest threats to the survival of sea otters. Oil spills leave slicks that float on the surface of the water and coat sea otters with a sticky film that mats their fur and destroys the protective warmth of their coats. If an otter's core body temperature drops a few degrees below normal, it can be fatal, especially in northern waters where the water temperature is much colder than in California.

The southern sea otter in central California faces a unique set of challenges. California otters often must compete with commercial fishermen for food.

Oil spill in ocean



Otter cleaned after oil spill

They are also more threatened by the effects of pollution than otters in the less-polluted northeastern Pacific. For these reasons, the southern sea otter is listed as "threatened" under the Endangered Species Act.

Since their rediscovery by Sharpe in 1938, the number of southern sea otters off California's coast has increased, though not as rapidly as in Washington or Alaska. California otters still have a high mortality rate. As otter populations increase, they deplete populations of sea urchins, abalone, and large crabs. Without a steady supply of regular prey, the otters turn to filter-feeding mussels, clams, and worms, all of which contain high levels of bacteria, viruses, parasites, and contaminants. Large predators, such as great white sharks and killer whales, also threaten otter survival.

At the beginning of the 21<sup>st</sup> century, 2,692 otters lived off the coast of central California. The engaging sea otter has become a symbol of how environmental pressures can affect interdependent marine communities. Despite a small decline in the otter's population between 2005 and 2006, the trend for the last few years has been slightly upward. As Howard Granville Sharpe wrote in 1938, "Nature's immutable law was: 'once extinct, always extinct.'" Sharpe understood nature, but he still could not figure out how the otter eluded him until that historic spring morning!

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**RST.9–10.2:** Determine the central ideas or conclusions of a text; trace the text's explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.

**Suggestion:** As students read this text independently, have them pause at this point and briefly summarize what they have read. Have them discuss with a partner the key details and important information they feel should be included in the summary.

**RST.9–10.8:** Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.

## California Common Core State Standards Descriptions for Grades 9–10

### Language Standards

- **L.9–10.6:** Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college and career readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression.

### Reading Standards for Literacy in Science and Technical Subjects

- **RST.9–10.1:** Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of explanations or descriptions.
- **RST.9–10.2:** Determine the central ideas or conclusions of a text; trace the text’s explanation or depiction of a complex process, phenomenon, or concept; provide an accurate summary of the text.
- **RST.9–10.4:** Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 9–10 texts and topics*.
- **RST.9–10.5:** Analyze the structure of the relationships among concepts in a text, including relationships among key terms (e.g., *force, friction, reaction force, energy*).
- **RST.9–10.6:** Analyze the author’s purpose in providing an explanation, describing a procedure, or discussing an experiment in a text, defining the question the author seeks to address.
- **RST.9–10.7:** Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematically (e.g., in an equation) into words.
- **RST.9–10.8:** Assess the extent to which the reasoning and evidence in a text support the author’s claim or a recommendation for solving a scientific or technical problem.
- **RST.9–10.9:** Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts.
- **RST.9–10.10:** By the end of grade 10, read and comprehend science/technical texts in the grades 9–10 text complexity band independently and proficiently.

### Speaking and Listening Standards

- **SL.9–10.1:** Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on *grades 9–10 topics, texts, and issues*, building on others’ ideas and expressing their own clearly and persuasively.
  - a) Come to discussions prepared, having read and researched material under study; explicitly draw on that preparation by referring to evidence from texts and other research on the topic or issue to stimulate a thoughtful, well-reasoned exchange of ideas.
  - b) Work with peers to set rules for collegial discussions and decision-making (e.g., informal consensus, taking votes on key issues, presentation of alternate views), clear goals and deadlines, and individual roles as needed.
  - c) Propel conversations by posing and responding to questions that relate the current discussion to broader themes or larger ideas; actively incorporate others into the discussion; and clarify, verify, or challenge ideas and conclusions.
  - d) Respond thoughtfully to diverse perspectives, summarize points of agreement and disagreement, and, when warranted, qualify or justify their own views and understanding and make new connections in light of the evidence and reasoning presented.
- **SL.9–10.2:** Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.
- **SL.9–10.4:** Present information, findings, and supporting evidence clearly, concisely, and logically (**using appropriate eye contact, adequate volume, and clear pronunciation**) such that listeners can follow the line of reasoning and the organization, development, substance, and style are appropriate to purpose (**e.g., argument, narrative, informative, response to literature presentations**), audience, and task. **CA**

### Writing Standards for Literacy in History/Social Studies, Science, and Technical Subjects

- **WHST.9–10.1:** Write arguments focused on *discipline-specific content*.
  - a) Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among the claim(s), counterclaims, reasons, and evidence.
- **WHST.9–10.2:** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.
  - d) Use precise language and domain-specific vocabulary to manage the complexity of the topic and convey a style appropriate to the discipline and context as well as to the expertise of likely readers.
- **WHST.9–10.4:** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.
- **WHST.9–10.7:** Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
- **WHST.9–10.9:** Draw evidence from informational texts to support analysis, reflection, and research.

### California Common Core State Standards Descriptions for Grades 11–12

#### Language Standards

- **L.11–12.5:** Demonstrate understanding of figurative language, word relationships, and nuances in word meanings.

#### Reading Standards for Literacy in Science and Technical Subjects

- **RST.11–12.2:** Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms.
- **RST.11–12.9:** Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.